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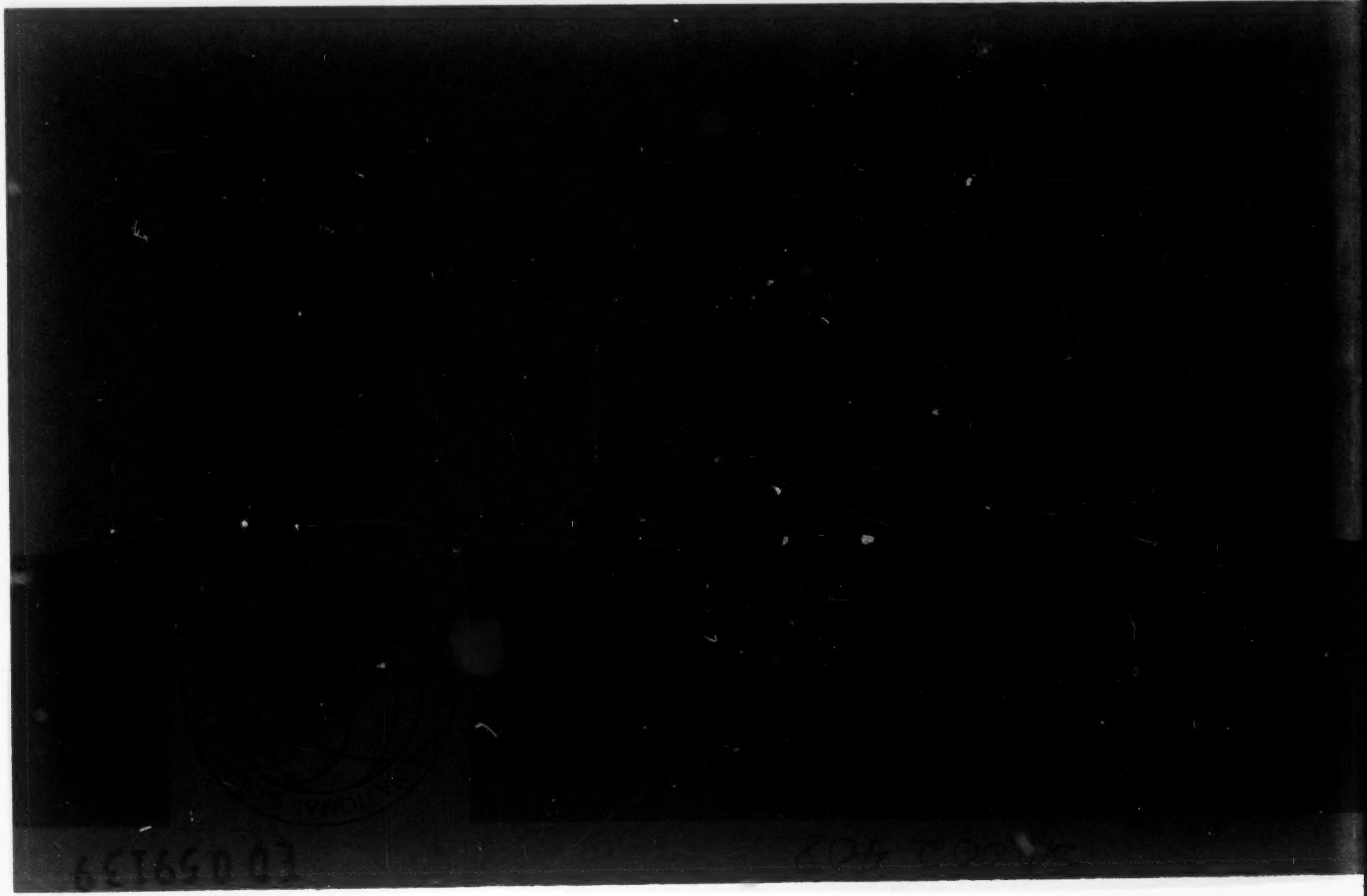
ABSTRACT

Three papers prepared for the Greyston Conference held at Columbia University October 18-20, 1964 and one paper resulting from conference discussions and inquiries by geographer-participants focus upon current research needs and opportunities for improvement in geographic education for elementary grades (ages 6-12). The four titles under which ideas are presented are: 1) What Does the Curriculum Worker Want From Research in Geographic Education?" urging the development of programs which include new content, sequences, materials and methods, an interdisciplinary approach, and better ways for providing individual learning; 2) "The Psychologist Looks at Spacial Concept Formation: Children's Concepts of Space and Time" describing a framework of conceptualization as a developmental sequence requiring that a child have the needed level of mental operations in order to grasp comprehensive ideas in geography; 3) "Suggestions for Research in Geographic Education" including six major topics for research in geography education, namely, inventories of prior research, the learning process, curriculum development, instructional materials and equipment, measurement, and teacher preparation; 4) "Some Opportunities for Geography in the U.S. Office of Education" identifying ways that geographic education and research can be supported by the U.S. Office of Education. (Author/SJM)



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Research Needs in Geographic Education

Suggestions and Possibilities

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Geographic Education Series Number 7

Research Needs in Geographic Education

Suggestions and Possibilities

NATIONAL COUNCIL FOR GEOGRAPHIC EDUCATION
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Preface

The Greyston Conference on *Research Needs in Geographic Education* was planned, organized, and conducted by Dr. Phillip Bacon and Dr. Lorrin Kennamer, Jr., during the time that they were Vice-Presidents of the National Council for Geographic Education.

The papers for the Conference were presented by Dr. Harold Drummond and Dr. Millie Almy. From these papers and the resulting discussions by the other participants in the Conference, Dr. Bacon and Dr. Kennamer have prepared "Suggestions for Research in Geographic Education." Dr. Allen Schmieder and Dr. Fraser Hart have presented some ways that these research needs can be assisted by the U.S. Office of Education.

All of the manuscripts were edited for publication by Dr. Herbert H. Gross, Editor of *The Journal of Geography.*

Financial support for the Conference and for the publication of the proceedings for distribution to the members of the National Council for Geographic Education came from the A. J. Nystrom Memorial Fund for Geographic Education.

KERMIT M. LAIDIG
Director of Publications

Foreword

Anyone who has ever organized a conference and subsequently attempted to pull together its proceedings, is keenly aware of the debts he accumulates. The chairmen of this publication are certainly no exception and, indeed, owe much to many.

First, we are particularly grateful to the officers of A. J. Nystrom and Company, who so generously met, through the A. J. Nystrom Memorial Fund, the fiscal requirements of both the conference and the printing of these proceedings. In truth, then, the conference would never have been held, and the report would never have seen the light of day, without this help.

A group of geographer-participants, whose names are found in following pages, gave unsparingly of time, when their only compensation was the non-material reward of working together on a topic of mutual concern. They responded to a barrage of inquiries before and following the conference. To them the chairmen express heartfelt thanks. The efforts of this distinguished group we then acknowledge, while absolving them from responsibility in our attempts to translate their gems of wisdom into the confines of these pages.

To Millie Almy, Professor of Psychology at Teachers College, Columbia University, and Harold Drummond, Professor of Elementary Education at the University of New Mexico, both of whom prepared the lead-off papers for the conference, the chairmen recognize a special debt. To have given so willingly of valued

time to meet with the Greyston geographers is response that goes far beyond the call of professional duty.

Allen A. Schmieder, United States Office of Education, and John Fraser Hart, Indiana University, who prepared a special report for this publication on new opportunities for research in geographic education, deserve a hearty measure of thanks. Their contribution provides, in a very real sense, the link between recognized need and the way of meeting the need.

Special tribute must be paid to two particularly devoted representatives of the National Council for Geographic Education: Herbert H. Gross, Editor of *The Journal of Geography* and Kermit Laidig, Director of Publications. The effort that they put into the preparation of this manuscript for publication and their devotion to the purposes expressed in these proceedings is deserving of far greater acknowledgement than this note can possibly convey.

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Introduction

At almost every turn, one is confronted by an ever-increasing concern that geographers have not and are not addressing themselves in significant numbers to problems related to geographic education. Geographic education will flourish only as the best minds in geography are willing to turn their attention to research needs in the teaching of their discipline. Geography in our schools is most strongly centered in the elementary grades; yet there is general dissatisfaction expressed by both geographers and educators about the nature of the offerings and the methods of instruction. Improvement in program and instruction are likely to come only as research in geographic education shows the way.

These concerns were discussed by the officers of the National Council for Geographic Education at a meeting in January, 1964. Their discussion led to a decision to call together a conference of scholars who would address themselves in a sustained fashion to the exclusive task of defining the precise research needs of geographic education. It was visualized that such a conference should develop a fertile seedbed of ideas to generate and stimulate inquiry into the frontiers of research in geographic education.

A conference was held at Greyston, Conference Center of Teachers College, Columbia University, on October 18-20, 1964. The conference was designed to focus intensively and exclusively on current research needs and opportunities in geographic ed-

ucation. Rather than attempting complete curriculum coverage, grade level consideration was essentially that encompassed by the elementary grades (ages approximately 6-12). This decision was predicated on several assumptions: (1) this is the level where geography plays its most significant role in the school curriculum; (2) the AAG-NCGE High School Project, although primarily course-construction oriented, has concerned itself with research needs in geographic education on the secondary school level; and (3) needs at the college level may be assumed to be covered through an NSF sponsored project concerning geography and liberal education.

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PART I

What Does the Curriculum Worker Want From Research in Geographic Education?

Harold D. Drummond

Traditionally, geographic education has been the heart of the social studies program in elementary schools of this nation. Recent curriculum developments, including the work of Larry Senesh at Purdue; Educational Services, Inc., at Watertown; and the Educational Research Council of Greater Cleveland, challenge the central position of geography in the elementary school social studies program. Whether we like to admit it or not, the time has come for leaders in geographic education to speak with clear voices—and also with loud ones—in halls where millions of dollars are being allocated for research. Such action should be taken for the most defensible of all reasons—the desire to know. It must also be taken, in light of current developments, if we believe geographic education to be of continuing importance in the lives of young Americans.

It seems to me that curriculum workers want answers to *six* basic questions from research in geographic education.

1. *What shall be taught?* This question probably is the most basic curriculum question of all. At one time, when we knew little about this planet and the human beings on it, the question was answered most frequently by selection of isolated facts. Thus, we had early American school textbooks in geography based upon a catechismal approach, with teachers reading the

questions, and children, often in unison, parroting the answers. Although those days are, to use the vernacular, "long gone," much of the current instructional program in geographic education still focuses attention upon facts—usually related, and usually of considerable significance. One of the most basic questions geographic educators need to answer other than philosophically, is *what facts need to be taught.* Of growing importance, though, because of the vast store of knowledge (facts) now available, is the much more significant determination of *concepts,* or *principles,* or *generalizations* which young learners should discover and develop as they work with geographic materials. As geographic educators know, Dr. Warman made a significant contribution in the Curriculum Guide for Geographic Education[1] in identifying nine basic concepts which should pervade all instruction. Six broad groupings of *skills* "associated with the use of geography tools" were identified in the same publication by Thomas Frank Barton.[2] Curriculum workers are helped in answering "What shall be taught?" by such thoughtful and comprehensive listings; *but* additional questions still remain. Which of the concepts or skills are most basic? Or are all of them of equal importance and worth to young learners in helping to order, systematize, and make understandable the world around them. At best, this question may *not* be solved satisfactorily by research; for it is essentially a philosophical one, but I'd like you to try to get some answers from carefully organized research efforts.

May it be, however, as John Mayor of the American Association for the Advancement of Science suggests, that there are some unifying ways of approaching knowledge which are essentially similar in a number of fields. He identified, for instance, "observing, classifying, measuring, drawing inferences, speculating, and experimenting"[3] as fundamental processes which may be equally as appropriate in the social sciences as in mathematics and the natural sciences. These may be useful, moreover, in the humanities and the arts. Could we in the months

[1] Hill, Wilhelmina, editor, *Curriculum Guide for Geographic Education,* Norman, Oklahoma: National Council for Geographic Education, 1963, pp. 9-27.

[2] *Ibid.,* pp. 51-71.

[3] Goodlad, John I., *School Curriculum Reform in the United States,* The Fund for the Advancement of Education, 1964, p. 56.

and years ahead, sponsor research which would help answer the question, "What knowledge is of most worth in geography?" If "observing" and "classifying," for instance, are fundamental processes, it may be that current materials now available for use by teachers in classrooms are of little value.

Essentially, the question "What shall be taught" is, in the language of the curriculum worker, a problem of *scope*. And, it is essentially a problem of what *should* be taught and learned, rather than a problem of what *can* be learned. Simply because a majority of youngsters by the time they have reached six years of age probably can be taught to regurgitate a list of the states and their capitals does not mean that they *should* be taught to do so. The toughest question for geographic educators, I suspect, is what not to include. The temptation is to be encyclopedic. If you can provide more specific help about the relative merit or worth of geographic content to persons who write textbooks, to publishers and editors who work with these materials before they reach the planned audience, and to curriculum directors and teachers who eventually will select from the available materials those which will be used, you will be making a significant contribution.

2. Quite naturally, to the curriculum worker, a second basic question follows: *In what sequence or order should the planned experiences be provided?* At this point, I wish to echo one of the most telling criticisms yet made about the major curriculum projects which have been supported by the National Science Foundation and other agencies.[4] In almost every instance, these have been developed from the top down. The specialists in the field (physics, biology, mathematics, etc.) have, in essence, spelled out in considerable detail the behavior which in their judgment a high school graduate should have developed. They have then decided, usually apart from youngsters, what should occur at the twelfth grade level to achieve the desired behavior. Likewise, analyses are made of what, therefore, should be accomplished at the eleventh, tenth, ninth grade levels and so on.

Most curriculum workers, I suspect, have considerable doubts about curriculum development based upon the "from the top down" process. We do not question that such processes may, at least for a period of time and in a particular stage of devel-

[4] *Ibid.*, p. 59.

opment, be very useful. However, we tend to see an individual learner moving through the educational process from kindergarten to the twelfth grade. And we would like very much for some additional groups and individuals to start with young learners. Some progress has been made this way—notably in mathematics by Suppes and in economics by Senesh. We curriculum workers would encourage you to turn loose some of the most creative geographic educators you can identify to work with young children, with teachers of young children, and with media experts in expanding the frontiers of knowledge about how children learn and about how we can help them to learn. We know little about sequential learning in the social sciences. We still are bound by cyclical patterns of presenting curriculum content which may have little or no validity, but are a part of our tradition: for example, the United States at 5th, 8th, and 11th grades.

As indicated in the *Curriculum Guide for Geographic Education*, moreover, the problem is not a simple one of a sequence. Probably, numerous sequences can be used to develop the understandings, skills, and attitudes deemed desirable. Therefore, I hope that you make plans for multiple attacks on the problem of sequence. It is likely, for instance, that children from the slums of our major cities need different direct and vicarious experiences than children growing up in the Isleta, Santo Domingo, or San Felipe pueblos in my home state of New Mexico. Furthermore, both of these groups may need quite different learning experiences, in diffferent sequences, from the upper middle class suburban youngsters for whom most of our materials now seem to be produced.

Because we are in the midst of a major social revolution in this nation just now—a revolution which will continue for at least the next quarter century—I would especially hope that particular research efforts be directed to the development of sequential learning experiences in geography for youngsters from neighborhoods commonly termed culturally disadvantaged. We know very little at present about *what* should be taught these youngsters so that they may be more able and willing to break the deadening blight of their homes and neighborhoods. We probably know even less about the sequential arrangement of learning experiences for these voters of tomorrow.

Another problem related closely to planned sequences which

must be considered as you move ahead with your deliberations is the age-old problem of economy of time. Pressures are being placed on teachers and curriculum planners to spend more time on science, mathematics, and foreign languages without lengthening the school week or year substantially. If we are to teach *more* in the same time, we certainly need to determine *when* certain things can *best* be taught. Some research in foreign language instruction, for instance, indicates that five years of instruction in grades 4-8 saves only about one semester of instruction at grade nine. Such findings do not necessarily mean that foreign language instruction should be postponed until ninth grade—but they do cause curriculum workers to resist somewhat efforts to capture more of the elementary school day for language instruction.

Our concern in this conference is when are the best times to teach concepts such as globalism, spatial interaction, perpetual transformation? When are the best times to teach globe and map skills, developing a sense of space and time-distance, reading and interpreting pictures? Are there sequences for such learnings through which young learners must progress if accurate understandings and effective skills are to result? A child crawls before he creeps; creeps before he walks; walks before he runs. Trying to teach him to run before he has learned to crawl is almost completely worthless. May we not, possibly, discover something similar with respect to geographic education. If you can test out several different sequences through research, you may make a valuable contribution.

3. *How can what should be learned best be learned?* Essentially this question is one of methods and materials. We all know that present practices are not very efficient. Geographers for years have written about the value of field experiences and firsthand observation—but such practices are used less frequently today than they were twenty years ago. We really don't know what students must do so that they will learn what we want them to. When is a film the best possible learning experience? In what instances, and with what content, and even with what pupils, are reading experiences vital in geographic education? What use can be made of newer media—programed materials, tape recordings, transparencies, slides, and such so-called "newer media"? When is discussion essential—when is it wasteful? We really don't know. This curriculum worker encourages you to

think about research which would help us find out.

4. *What relationship exists, and should exist, among geographic learnings and the rest of the learning day?* Although not all learnings must be related, the total program for the learner should have some unity and should make sense. One of the basic problems curriculum workers face is that most efforts at curriculum reform at present are being made within the various major academic disciplines. I do not decry this development. In fact I think it is very wholesome for geographers, historians, anthropologists, economists, political scientists, and sociologists to look hard at contributions their respective discipline can and should make in the education of young Americans. Nevertheless, someone has to put the pieces together or most of the school day will be a process of starting and stopping; and closely related facts, concepts, and methods of inquiry may not be functionally taught.

This task is the essential role of the curriculum person—the generalist who is concerned for balance and unity—but geographic educators have a rare opportunity to help. Geographic education, it seems to me, can and should be the unifying base for social studies instruction in elementary schools. I hope that, as you design some research proposals, you will remember the contributions which the historians, anthropologists, sociologists, and others, can and should make to a good program of social studies. As a next step, following this meeting, I hope you will ask some carefully selected social scientists from other academic disciplines to look critically at your proposals. In other words, I hope that you will help curriculum workers by building into whatever materials and/or instructional packages you develop not only learnings which are basically geographic, but also related learnings from other social sciences. Whatever you do will have much greater acceptance from curriculum directors and teachers if you look at the *total instructional task* rather than only one segment of it.

5. *What can be done so that the teacher will do a better job of instruction with the individual learner?* We college and university professors seem, generally, to be willing to work individually with doctoral students, but not with freshmen (who usually get the same dose regardless of their past experiences, present capabilities, or future goals). Most elementary school teachers try to know and understand their youngsters, although some attempts at improving instruction, such as the widespread

use of educational television and team teaching of many different varieties, tend toward a less personal approach. In a real sense, teaching at the doctoral level and in the kindergarten are more alike than at any levels in between. I am convinced that the human equation remains a significant one—for I visit in classrooms where obvious intellectual challenge is supported by warm human relationships *and* in classrooms where presumed intellectual challenge is largely negated by tensions, fears, and threats.

One of the teacher's basic problems is how to care for the range of individual differences which exist in the classrooms. Those who haven't been around children in years tend to see *a* simple solution to the problem—grouping, or tracking, or high rates of non-promotion, or national exams. Those of us who spend our lives with children are not that naive. Children just don't fit into nice easily managed groups or classes or tracks. We need to know a great deal more about how to teach individuals. Some of the experimentation underway by psychologists will undoubtedly help a bit; but it seems to me that academicians can also help as they look at their own areas of content and method.

I hope that you, in your deliberations, think about every learner, and especially about those whom Kimball Wiles terms the forgotten 30 percent. He calls attention to those not handicapped enough to be termed mentally retarded, and yet not able enough to be in the upper two-thirds of the class. These youngsters can learn, but frequently they need kinds of experiences other than those provided for children who read well, have aspirations for college attendance, and like school. They probably need fewer vicarious experiences and more concrete ones; they probably need more manipulative experiences and fewer verbal ones, *but we need to know.*

If, in what you propose, you can help curriculum workers and teachers provide for a wide range of differences, you will be making a real contribution to American education.

6. *How can teacher preparation and education be improved?* How can teachers already in the classroom be helped to develop the new insights, the new understandings, the new skills essential if revised programs and better programs in geographic education are to become common in American elementary schools? NDEA funds should help markedly in this endeavor. I hope that

some of the funds will be utilized to improve geography teaching in colleges and universities. Too frequently, instruction at the collegiate level in geography essentially is a process, as far as the students are concerned, of note-taking, textbook reading, and regurgitation of both periodically at test time. Too frequently, students have little or no involvement in "observing, classifying, measuring, drawing inferences, speculating, and experimenting." We should not expect elementary school teachers to improve to any marked extent the ways they share geographic educational experiences with children until their own learning experiences are improved. Some of your ideas for research, therefore, should be centered on improving your own teaching practices. Some of you may wish experimentally to test some hunches you may have. The ultimate goal should be students not only able to vacuum their notebooks, but also capable of thinking geographically and able to handle new materials systematically and effectively. Moreover, we would hope that as a result of collegiate geographic education, students will have developed modes of inquiry and knowledge of sources which will enable them to continue to learn long after graduation.

One other problem should briefly be noted. Let us assume that new programs will be developed which include new content, new sequences, new materials and methods, new and/or expanded relationships with other social sciences, and better ways of providing for individual differences. The programs will undoubtedly be better than current ones. Unless you design your research so that you build into it plans for continuous revision of programs, sequences, materials, and the like, based on use in classrooms; and unless you build into your efforts ways of continually updating the programs, they will quickly be out-of-date.

The task of the researcher in geographic education is an important one. There are immediate needs, but the process of investigation must be ongoing. Efficiency demands continuity.

PART II

The Psychologist Looks at Spatial Concept Formation: Children's Concepts of Space and Time

Millie Almy

To discuss questions of space and time, and how the child comes to conceive of them could be to deal with man's comprehension of himself and his place in the universe. Indeed the psychologist who more than any other has concerned himself with such questions, Jean Piaget, traces the origins of man's intelligence and his ability to grasp the universe to his earliest encounters with spatial and temporal displacements of various kinds (Piaget, 1954).

For the purposes of this paper, however, I shall refrain from excursions into space beyond this planet. Partly this limitation stems from my understanding that the geographer is to a considerable extent earthbound. Partly it reflects my belief that children, particularly the young ones about whom I know most, are, despite the brilliance of their inter-planetary vocabularies, on somewhat firmer conceptual ground, so to speak, when they consider spatial ideas that can be directly experienced, than they are when they must depend entirely on a T.V. or picture image.

Not too long ago, for example, a group of intelligent four-year-olds working under the direction of one particularly verbal youngster built a space-ship. The child suggested a trip to

Mars, and recruited several passengers. When they attempted to climb directly aboard he directed them to go through the turnstile and deposit their tokens before they began the ride. Once the young travelers were settled, he proceeded with the countdown and blast off. The arrival at Mars was shortly and appropriately announced and the children climbed out, receiving a special admonishment to exit via the turnstiles. An interested observer who questioned the child about the location of Mars learned that it was in outer "space." Not quite satisfied, she pursued the matter a bit further and was reassured by the child that outer space was "just beyond Brooklyn."

You are interested in geography education for the elementary school child and the confusion a four-year-old expresses in his play may seem somewhat remote from the topic. However, it illustrates a principle related to concept formation that holds throughout intellectual development. The ability to use words facilitates the acquisition of concepts. But words may also serve as a façade to mask misunderstanding. If education is to be effective the child needs many opportunities to test out the adequacy of his concepts in a variety of contexts.

Before we consider those concepts that have special relevance for the geographer, it may be well to give some attention to what the psychologist has in mind when he talks about concepts and the ways children develop them. Then I shall discuss some spatial concepts that have been studied in children here and abroad. Finally, I shall raise some questions that I should like to see geographers consider as they think about education for the elementary school.

The psychologist regards concepts as systems of meanings within the mental organization of the individual. They arise as he generalizes from his experience, and serve as expectancies or hypotheses for the classification of incoming information. Concepts are, as one psychologist has put it, "formed, changed, enlarged, or subdivided by a feedback process where the idea is continually tested in new contexts and modified accordingly" (Harris, p. 191, 1963).

In the context of a particular discipline, say mathematics or physics, and presumably geography, the connotative aspects, that is, the personal and subjective meanings of concepts, are of secondary importance. Of primary concern are the denotative meanings, the literal, publicly agreed upon referents that make

it possible for the members of a discipline to communicate with one another.

Studies of the acquisition of concepts, and more specifically of denotative meanings are by no means conclusive, but the process is usually described as involving both discrimination and abstraction (in the sense of taking from) of an essential feature or characteristic in one set of experiences and generalization as similar instances recur. The process may or may not be conscious. A fully adequate concept accordingly involves recognition of its defining attributes, that is, the similarities among the members composing the class of objects or events involved in the concept, the differences that can also be encompassed within the class, and, finally the recognition of possible multiple class membership.

By a series of gradual steps of which we are not yet fully aware, children develop and are able to manipulate an ever increasing array of adequate concepts. Or perhaps, considering the extent of their knowledge at age eight, as contrasted with say age two, we should say that the breadth of knowledge increases by leaps and bounds in the early years. And, contrasting age seven or eight with age twelve or thirteen, we can note an increasing ability to process information efficiently, culminating eventually, if all goes well, in an ability to depart completely from the concrete and deal effectively with purely abstract ideas.

To illustrate some of the differences in conceptual power to be expected as children grow older, consider a task of a sort often used in experimental studies of concept formation. We place in front of the child an array of flat counters of varying shapes — squares, triangles, circles; varying colors — red and blue; and two sizes—large and small. Perhaps we ask the youngster to put together those that go together, or are alike, or the same. The least intellectually mature children, those under four, and perhaps under five, may grasp the notion of "sameness," but are often distracted in their sorting by arrangements they find intriguing. Thus, two red circles and a red square may suggest a fire engine, they lose the guiding idea, and begin a bit of personal play or design. A more mature five or six year old may be quite able to sort on the basis of color, or form, or size, indicating that he can keep one property in mind without being distracted by differences in other aspects of the objects. A still more mature youngster can sort on two, or possibly three dimen-

sions at once—small red triangles, large red triangles, small blue triangles, etc. Yet even here we can not be sure of the adequacy of his concepts, for he may have no real notion of redness, greenness, squareness, roundness, or triangularity apart from the objects that can be matched.

Children can distinguish between a circle and a triangle, indicating a perceptual awareness of spatial arrangement from as early as six months, but evidence that they can *represent* these forms, that is, think about them and accordingly reproduce them does not appear until after age three for the circle. Other figures are more difficult and not until after the age of seven can the average child copy a diamond, for example (Terman and Merrill, 1960).

One way to test whether or not the child's sorting of forms of varying colors and sizes exemplifies a well-developed ability to handle *logical* classifications is to probe his understanding of the relationship between a total class and its subclasses. Suppose, for example, that he confronts an array of square counters, some red and some blue, with a few blue circles mixed in. Posed with the problem of whether it is true that all the circles are blue he may insist that this is false since there are also blue squares. Or, paying attention only to the blue counters, he may be unable to decide whether there are more blue counters, more blue squares, or more blue circles. Such confusion may persist among many children until around age eight.

What these children lack, according to Piaget's analysis, is a kind of reversibility in thought. The child, having mentally sorted the blue counters into squares and circles, is struck by the perceptual preponderance of squares, and can not go back mentally to the original totality. This inability to cancel mentally an observed physical transformation characterizes much of the thought of the young elementary school child. It is not until the age of seven or eight that he is able to "conserve" properties, attributes, and relationships of observed phenomena and consequently avoid logical contradictions. From this point forward his thinking processes closely resemble those of the adult, except for the fact that he tends always to be bound to concrete data. This is to say that he is not likely to be able to work directly with a formula as some adults can when dealing with some problems. Rather, he (as many adults do) has to have a specific situation to tie to, if he is to work out the relationship of one

variable to another (Stendler, p. 324, 1964).

By the end of the elementary school period, however, thought is no longer so bound to the concrete. The youngster can depart from the data of a given phenomenon and reason systematically about the *possible* relationships that might account for it. He can handle logical propositions and make deductions.

This picture of concept-formation and the development of logical reasoning is admittedly a somewhat biased one. It is the picture painted by Jean Piaget, a Swiss psychologist, who is said to be "a zoologist by training, an epistemologist by avocation, and a logician by method" (Inhelder and Tanner, p. 75). American psychologists have been extremely critical of some of his works, but tend to agree that the general sequence of development he describes is an accurate one. Whether the modes of thought characteristic of each stage in the sequence are as pervasive as Piaget implies, and whether transitions from one level to another can be facilitated by special training is a moot point. So far, attempts to train on specific tasks have been effective only where the children themselves had indicated some uncertainty or readiness to shift their thinking before training began. I shall try to clarify this point when I describe some of the research on spatial concepts.

Piaget's writing, whether in the original French, or in translation, is often difficult, particularly when he is arguing the intricacies of his theories. But he is unique in the ingenious ways he has devised to enter into the thought of children. Even if his theories of cognition come to nothing, I believe that educators who trouble themselves to repeat his experiments cannot help developing new insights about teaching and learning. And nowhere will they find a wider range of concepts to explore, for he has written volumes not only about logical thinking (Inhelder and Piaget, 1958) (Inhelder and Piaget, 1964), but also specifically about space (Piaget and Inhelder, 1956), time (Piaget, 1955), number (Piaget, 1952), quantity (Piaget and Inhelder, 1956), and geometry (Piaget, 1960).

As I have tried to decide what aspects of the child's conceptualization of space to present to you, I have selected experiments that have been replicated by researchers other than Piaget. I have also been guided by a notion about those aspects of space that would most likely be relevant to an understanding of geography.

Since my own concepts here are somewhat fuzzy, probably much more connotative than denotative, I shall not attempt to spell them out, but leave them for you to infer.

To the adult, space, whether it be that immediately impinging on him or more distant space, can be organized. The beginning of organization is implied in the use of such works as "up, down, right, left, over, under, above, before, behind." The adult can repeat these relationships to himself in thought and has no need to traverse the space involved to grasp them. Moving mentally from one space arrangement to another he can compare magnitude relationships—length, size of areas, volume—or projective relationships—point, line, cross-ratios.

According to Piaget, the ability to conserve dimensions, distances, systems of coordinates that underlies thinking of this kind is the outcome not solely of repeated visual perceptions but also, and perhaps more importantly, associated actions repeated in many settings and with many objects.

The extent to which action permeates the early development of space concepts has been noted by many students of child development, and presumably by many parents. One three-year-old, for example, who had entered a zoo by one set of stairs and left by another, refused to use the latter for entrance, saying "These are the wrong steps; these are the going-down steps . . . the others are the going-up steps." The same child when he was seven attempted to lead his mother from his house to a strawberry patch he had seen on a walk through the woods. Although the patch was five minutes from the house, he could not retrace his steps directly but had to follow the circuitous forty-five minute trip he had taken originally (Werner, pp. 173 and 175, 1948). Action presumably predominates in the space concepts of children who maintain up to the age of seven or so that the distance traversed by an elevator is greater when it is ascending than when it is descending (Inhelder in Kessen and Kuhlman, p. 30).

The notion of distance at this early age, appears to apply more clearly to empty than to occupied space and there is difficulty in combining the two. Thus in one experiment children estimated two dolls as being closer together when a screen was inserted between them because "the screen takes up some of the room; if there was an opening in it, the distance between the two dolls would be the same as before" (Inhelder, p. 30).

Piaget theorizes from experiments involving children's abilities to match objects and forms tactually perceived with those visually perceived, and from another ingenious series of experiments involving their responses to strings with knots tied in them, that the earliest conceptualizations of space have to do with its topological rather than its Euclidean or projective properties. Thus the first spatial properties that can be represented in thought are proximity, separation, order or spatial succession, surrounding, or enclosure. The development of a notion of continuity of lines and surfaces represents, according to Piaget, a synthesis of these other ideas, and continues to change into the period of adolescence (Piaget and Inhelder, pp. 145-149, 1956). Replications of these experiments by English researchers (Lovell, 1962) have raised some questions regarding the strength of some of Piaget's statements but they do not seem to throw into question many of the general trends he describes (Flavell, pp. 388-389) so far as the early abilities of children are concerned. The point of greatest disagreement between Piaget and those who replicate his work has to do with the relationships among the various sub-abilities he believes are involved in a given cognitive function. English and American studies do not find these relationships to be as tight or as rigid as Piaget's investigations, or his theory based on logical analysis, have implied. As one critic has put it, "it is by no means certain that because some relations are fundamental to the *logical* analysis of mathematical properties, these same relations underlie the psychological evolution of their recognition" (Lunzer, 1960).

Piaget's theories relating to the child's conceptualization of space from either a projective or Euclidean, rather than exclusively topological viewpoint, emphasize the importances of the child's ability to deal with *relationships* in space, apart from his own position in it.

Accordingly many of the experiments in the projective section of his volume on space concern the child awareness of how objects will appear from various viewpoints.

In one of the simplest of these, the child is given a set of matchsticks set in plasticine bases and asked to place them in a straight line (like telegraph poles along a straight road). The first and last poles are placed for him, in the easiest tasks so that the line will run at an oblique angle to the edge. Here are some of the results, as reported by Piaget (Figure 1).

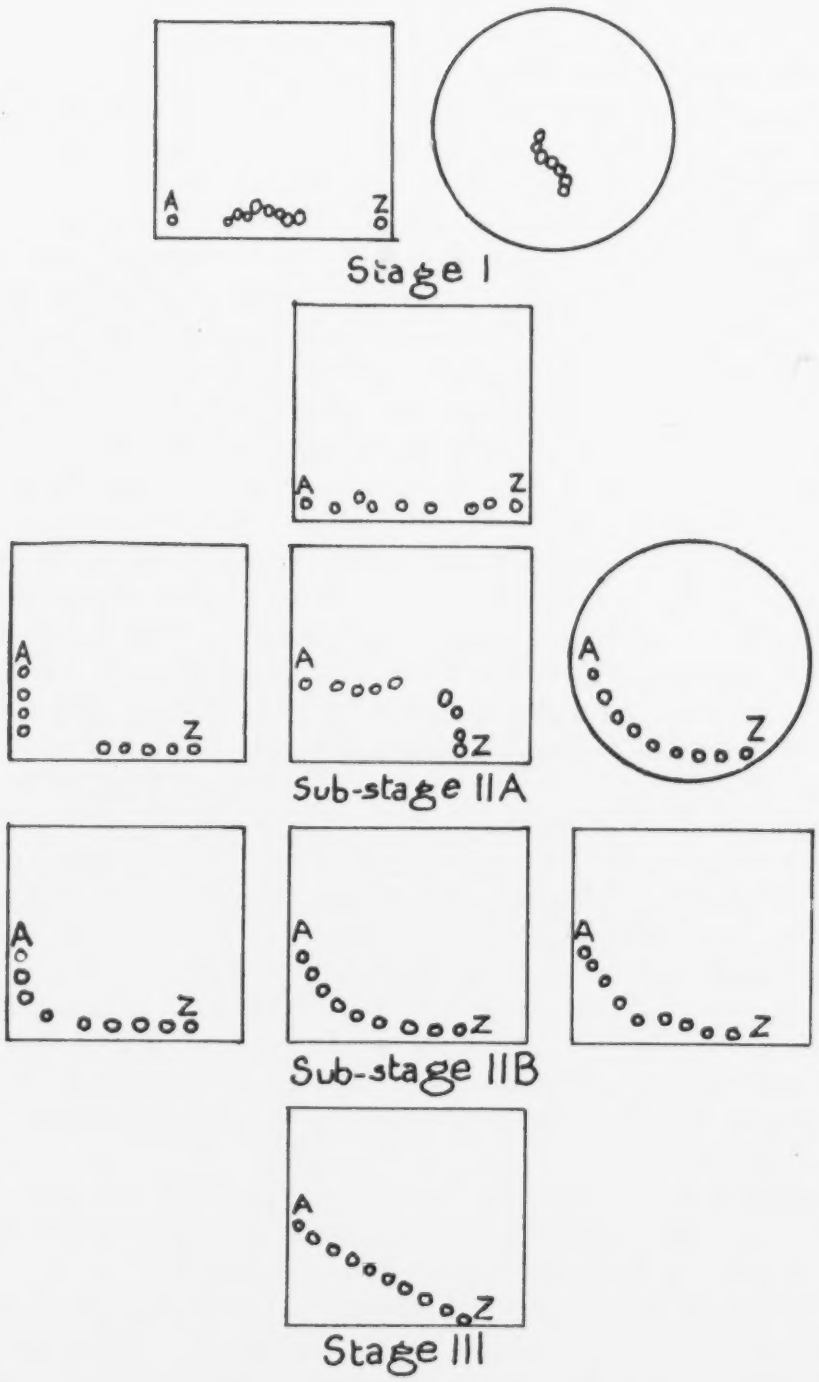

Figure I
(From Jean Piaget and Bärbel Inhelder, *The Child's Conception of Space*, p. 157; By permission of Routledge and Kegan Paul Ltd., London.)

Attempts to replicate this particular experiment here and in England indicated that the younger children were more able than those investigated by Piaget. Nevertheless, the transitions depicted illustrate the difference between a perceptual grasp of a straight line, and its truly conceptual grasp. Only when the child can accurately construct from his imagination a straight line while disregarding the cues provided by the table, can we be sure that he has an adequate concept.

Many of Piaget's children who succeeded in this task did so by sighting or taking aim from the matchstick placed first to the one placed opposite. For Piaget this represents the child's dawning recognition of the fact of differing points of view. Until this emerges he tends to be egocentric in many of his thoughts and to believe that the world as seen by others is the same as he sees it.

This fact is illustrated in another experiment which also suggests that the child may be conscious of other's views before he himself is able to distinguish what those views might be.

In this experiment a pasteboard model of three mountains is put in front of the child (Figure II). In one part of the experiment, he is asked to select perspectives from a set of pictures showing the mountains from differing viewpoints. In another, he has replicas of the three mountains to be arranged as seen in a given perspective. Finally there is a wooden doll that can be moved around the mountains so that the child can be asked to reconstruct by inference the changes in perspective that will accompany the doll's movements, or the position the doll must take to suit a particular perspective.

Using a sample of 100 children, Piaget found that not until an average age of about eight did the children vary relationships with changes in the position of the observer. And not until after nine was such variation sufficient as to suggest a coordination of viewpoints. It was not that the children were unaware that the views would be different, but rather that they lacked any systematic way of dealing with them.

Piaget sees the child's ability to arrange his ideas systematically, that is to coordinate relationships, emerging as he carries out actions in or on his environment, and as these actions become internalized, they can be mentally recaptured at will. This theme is illustrated in a number of experiments that I shall not describe but only mention. Included is one

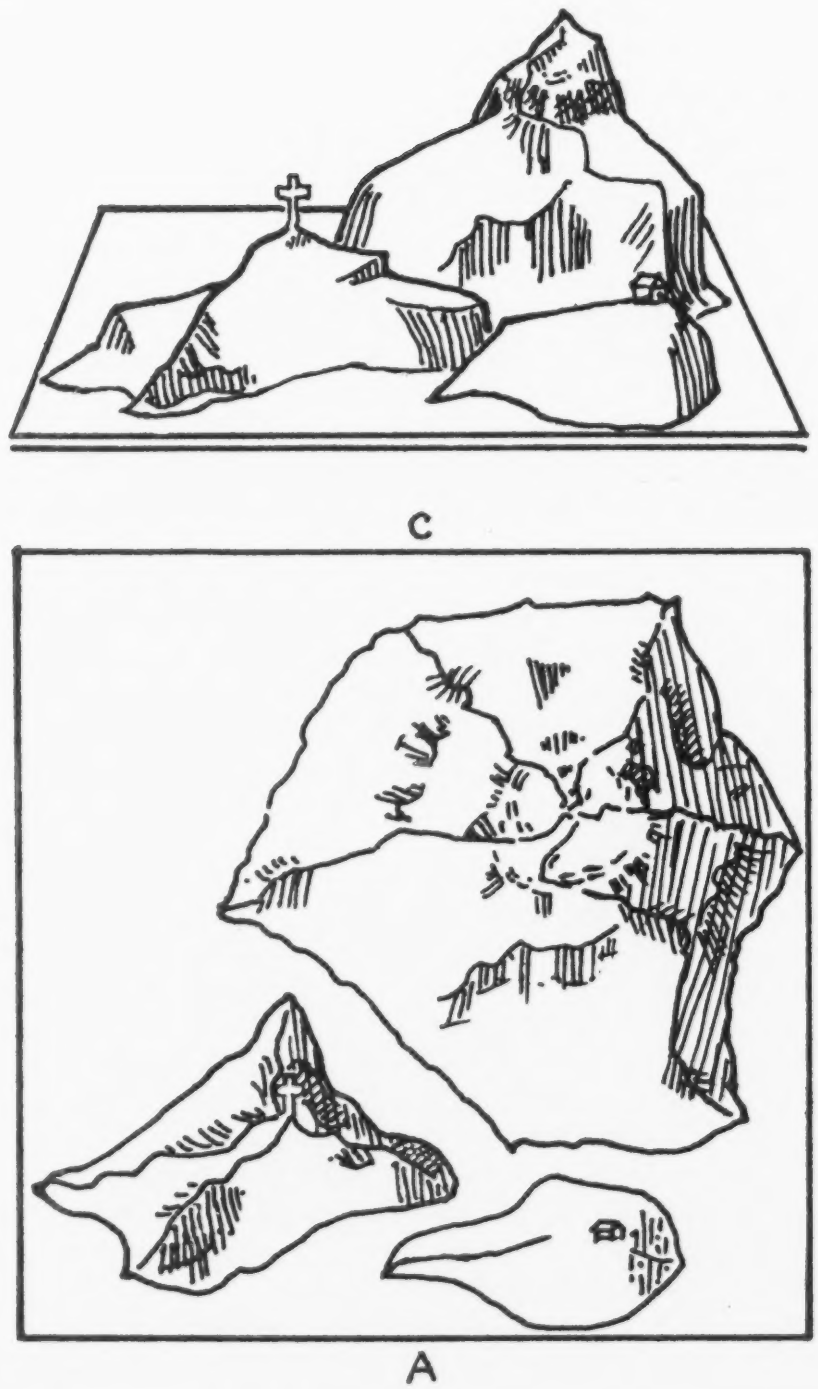

Figure II
(From Jean Piaget and Bärbel Inhelder, *The Child's Conception of Space*, p. 211; By permission of Routledge and Kegan Paul Ltd., London.)

involving children's ability to anticipate the result of the sections of various geometric solids. This calls for mental reconstruction of the movement of the knife through the solid, the path it will take, and a variety of viewpoints on the solid (Piaget and Inhelder, p. 269, 1956). Another experiment deals with the rotation and development of the surfaces of solids.

Two more experiments concerned more with Euclidean than with projective properties also illustrate the relationship between actions, internalized as mental "operations," and the ability to deal with spatial relationships systematically. One of these makes ingenious use of a scissors-like tool known as a lazy tongs in which, depending on whether the tool is opened or closed, the shapes of the rhomboid openings change, but always remain parallel. Another involves the construction of triangles and rectangles similar in shape to a model but differing in size. From the latter, Piaget demonstrates how the child comes by the age of ten or so to be able to handle proportions.

As Piaget notes, the organization of space in a two or three dimensional reference frame seems at first glance extremely elementary. "When we view the familiar objects around us, they appear arranged within a grid of parallel straight lines, crossing each other perpendicularly in three dimensions. And if this view of things appears self-evident it is because physical experience itself seems to force upon us just such a structure by virtue of all the verticals we perceive as parallel and appearing to cut the horizontals at right angles" (Piaget and Inhelder, 1956).

But the two or three dimensional frame of reference so obvious to the adult is not so to the child. Rather, in Piaget's view, it is the ultimate outcome of a long series of experiences involving both perception and action. It involves a kind of coming together of notions of relations that are "internal to each object or pattern" Euclidean relations "established between numbers of objects and patterns," together with certain notions of perspective.

One of the experiments, among many others, that has led Piaget to this conclusion has been replicated by a Norwegian investigator. The replication illustrates the Piagetian principle of learning discussed earlier.

In describing the experiment Piaget notes that on an empirical level the child's notion of the horizontal presumably derives from the plane on which everyday objects rest, the earth

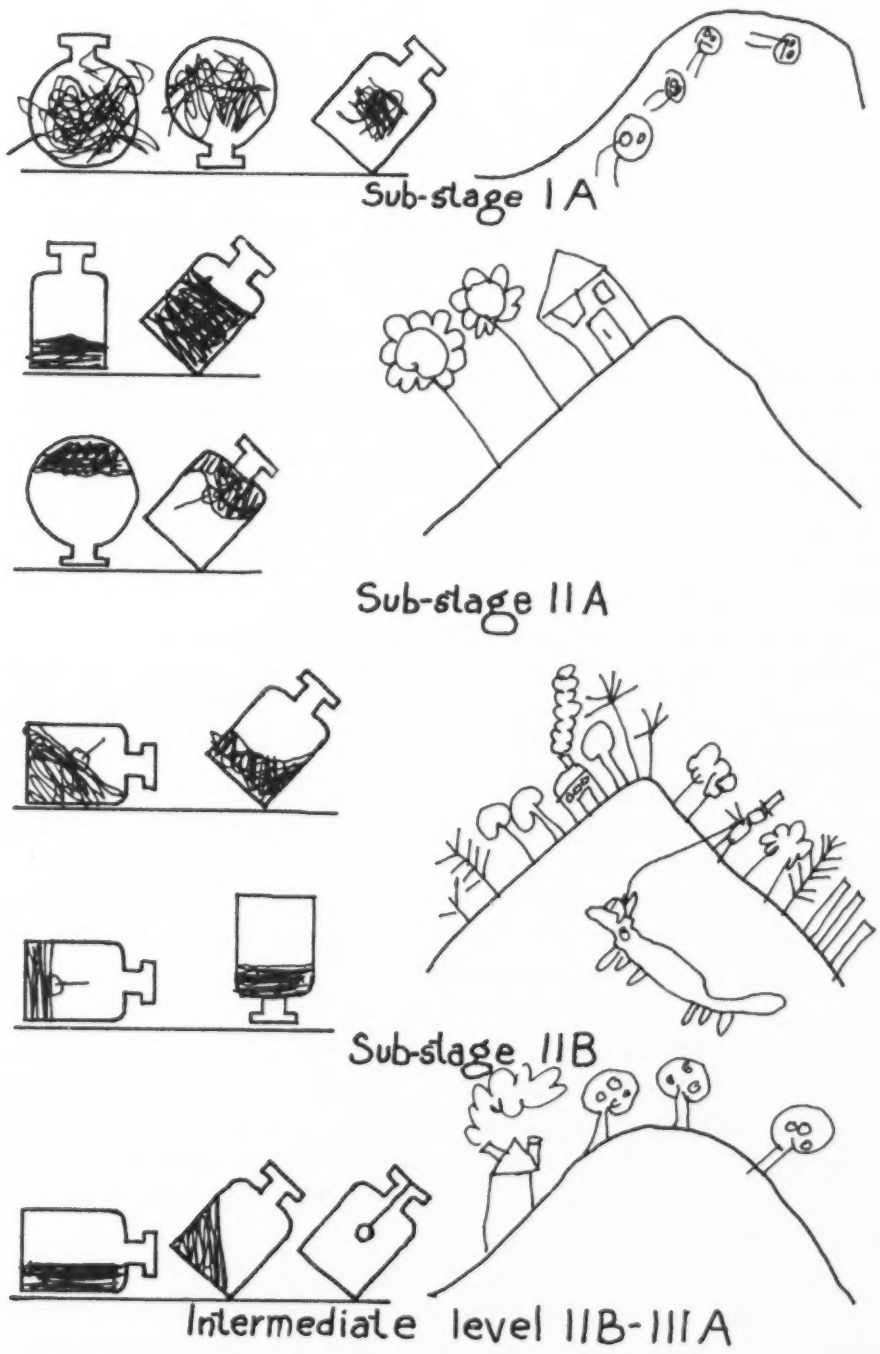

Figure III
(From Jean Piaget and Bärbel Inhelder, *The Child's Conception of Space*, p. 383; By permission of Routledge and Kegan Paul Ltd., London.)

where flat, the artificial planes of floors, and the surface of liquids. He adds that the Geneva children he interrogated are daily observers of the surface of Lake Leman. Similarly, walls, posts, chimney stacks, trees, provide the vertical axes. To find out how the child makes reference to these vertical axes, Piaget has studied the child's discovery of such physical laws as the constancy of the surface of a liquid whatever the angle of the container, or the constant direction of the plumb line whatever the angle of nearby objects.

For the study of the horizontal concept the children were shown several bottles each about one-quarter filled with water, and asked to indicate what positions the water would assume when the bottle was tilted. Then the bottles were actually tilted and the children were asked to draw what they saw on outline drawings of the bottle. For the vertical concept, a cork was floated on the surface of the water with a matchstick rising vertically from it, and the children were asked to draw the matchstick mast at different inclinations. A plumb line inserted in an empty jar which was tilted was also used. Finally the children were shown a mountain of sand or plasticine and given the task of planting posts on the summit, nearby ground, and on the slope.

Here are some of the drawings resulting from these experiments (Figure III).

At stage I, the child has no apparent knowledge of planes either horizontal or vertical.

At stage II, spatial orientation seems determined by the configuration represented, rather than by an external system of reference. At III, the child apparently recognizes that the water will not parallel the base of the vessel but he does not coordinate his prediction with any fixed reference system. In the intermediate stages, the discovery of horizontal and vertical axes begin to emerge.

Smedslund's replication of this study with five-to-seven year olds in Oslo, Norway, involved a pre-test of the children's ability to draw the water surfaces in bottles; a period of observation, or, if you will, training; and a post-test.

The results in general confirm Piaget's findings, but also showed that children who had at least one correct drawing in the pre-test were most likely to improve in the post-test. Smedslund interprets this according to the Piaget dictum that "every

contact with external reality is patterned according to the existing schemata (or conceptual framework) of the subject" (Smedslund, 1963). Or, to put it another way, the child's ability to grasp or discover a new concept is dependent on its congruence with the ways he has already organized his experience. Smedslund goes on "(the child's) representation of the water surface is not contradicted by his perception of the water surface in the actually tilted bottle because neither his representation nor his perception involves a placing into relationship of the water surface and the supporting table. This placing into relationship probably occurs as a part of a gradual process of organization of the subject's representation of space." The child learns most effectively, and new concepts can be assimilated most readily, when the new information can be readily accommodated to existing concepts. This seemingly obvious principle has often been overlooked in educational practice, for reasons that I shall discuss later.

Piaget's studies, involving no direct attempts to teach children to use a system of horizontal-vertical coordinates, indicate that not until after the age of nine were most youngsters able to construct a reference system. For example, children of these ages, given the task of copying an arbitrary pattern of beads or counters, were able to use two rectangular strips of paper as guides, but not until about eleven years did the children use the strips as true coordinates.

Somewhat similar results were recently obtained by one of my students who presented children with the task of marking a plain sheet of paper with a dot in the same position as it appeared on another paper of identical shape and size. Although all the children he tested came from a good neighborhood and several from schools with the so-called new mathematics program, only the ten-year-olds consistently solved the problem by the use of a coordinate system. Younger children were confused when the two sheets of paper were differently oriented in space or when the task was presented on a round as opposed to a square table.

Some of the studies that have attempted to replicate Piaget's experiments are in less close agreement with his findings than these I have cited here. It seems clear that the actual progress in concept attainment made by a particular child is not always so close an approximation of a logical model as Piaget would

have us believe. Nevertheless, there does seem to be a sequence that holds, and children do progress from a personally oriented, one-variable-at-a-time kind of thought to a more mobile, readily reversible handling of several variables, and eventually of relationships among variables.

So far as progress in understanding spatial concepts is concerned it is probably safe to assume that the elementary school child begins with a rather global notion of space, organized largely in terms of his own actions in it, and his remembrance of that action. Gradually as this thought becomes more mobile, as he becomes increasingly able to abstract and hold on mentally or, in Piaget's terms, to "conserve" straight lines, angles, curves, distances, and as he develops a stable concept of number, so that he can measure, the space he knows becomes more organized. *Once he can envision space, or the objects occupying it, in the* framework of a coordinate system he is no longer so bound to the space he has experienced directly.

I should assume further, that the ability to handle logical classifications, of which I spoke earlier, ought to considerably facilitate understanding of the variety of object or phenomena that might be distributed about a particular reference system.

Now I should like to reconsider the principle of concept acquisition to which I have referred from time to time. You will note that I have described a *sequence* of development in the understanding of spatial concepts. From time to time I have indicated the average age at which a particular group of children grasped a particular concept. Presumably some of the children had discovered, or could have discovered the concept earlier, and others who did not discover it during the experiment, could have done so had they had available certain prior concepts. Without these prior concepts, any attempts to teach the new ones would likely result in either complete lack of understanding or a pseudo-understanding in which a correct response could be verbalized but would not be believed by the child. Essentially, I am saying here that chronological age or more precisely, mental age, provides a rough index to the child's ability to comprehend a certain concept. But age is only one factor. The kinds of experiences a child has had and the ways these experiences contributed to his conceptual repertoire are equally important.

I do not intend this statement to indicate complete agree-

ment with the dictum attributed to Jerome Bruner that "any subject can be taught to any child at any age," if appropriate instruction is provided. Rather, I should like to indicate that we do not yet know how extensively we might increase the intellectual power of youngsters if attention were given to the assessment of the child's conceptual level as new ideas are introduced to him. Failure to note in sufficient detail what and how the child is thinking often leads to confusion and gaps in his understanding.

I would hope that the geographers in planning for research in geographic education would attempt a dual analysis involving on the one hand, the ideas involved in geography, and on the other, the mental operations needed to grasp them. I should like to see less emphasis placed on how early a particular idea can be taught and more on the nature of its intellectual underpinnings.

Perhaps I can illustrate. Recently I visited a second grade in a very fine elementary school. The youngsters were intellectually advanced. Their teacher respected their abilities and encouraged them to think for themselves. I have never seen better work in mathematics than this group was doing. In the course of the morning, I talked at length with several children about their learning. One little girl showed me a workbook in which she had completed various exercises involving the mapping of a community described in some of the related reading material. She followed many cues in the book appropriately and her work was correct. I then engaged her in a conversation about maps. Had she ever made a map of her neighborhood? "No." Suppose she were to locate the school on a map, which direction would it face? She did not know. "Which direction does your room face?" She did not know. "What time of the day can you see the sun from the windows?" Glancing outside, she said, "In the morning." "So in what direction do you think the room may face?" She looked puzzled, then said, "Well the sun rises in the *east*."

I would suspect that this little girl lacked or was only beginning to acquire the conceptual framework needed to understand the activities of the workbook. She was bright enough to manage quite well for the present but the eventual outcome could well be a persistent confusion or a failure to comprehend new or more complex mapping ideas readily.

In this connection it should perhaps be noted that some of

the research indicates that girls are somewhat slower than boys in dealing with spatial relationships (Anastasi and Foley, 1949). Accordingly, they may need more direct experience. Such individual differences in rate of learning, and differences in ways of learning are, of course, factors that importantly influence concept development. I hope the geographers, in their consideration of the spatial concepts they want children to learn, will not overlook the contribution of other areas of the child's educational experience to his understanding of space. Mathematical concepts, as I have indicated, are clearly related, and concepts in many aspects of elementary science are also relevant. So probably are many of the sorting and classifying tasks that come up in the language arts. Less obvious, but no less important, are the activities that may be involved in such diverse activities as block building, painting, drawing, modeling with clay, or dancing. In view of the rudimentary nature of the concepts acquired by young children, programs in mathematics, science, language arts, economics, history, and geography inevitably overlap. Eventually someone must come to the rescue of the six, seven, and eight-year-olds and perhaps also to that of their older brothers and sisters, so that their instruction need not be so fractionated as is the case as many new programs are begun. Perhaps the geographers, latecomers on the scene of curriculum revision, can begin rather than end with a notion of the way the concepts needed in their discipline are tied to those represented in the other disciplines.

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PART III

Suggestions for Research In Geographic Education

Phillip Bacon and Lorrin Kennamer, Jr.

Part III contains a series of suggested topics for which research investigations are urgently needed. The suggestions are not spelled out in detail. This has been done quite deliberately, for the interested investigator would certainly wish to develop his own procedural outline. However, the topics listed under six major headings do provide for a variety of investigations, procedures, and demands in terms of financial support, research talent, and time. Furthermore, the listings make no pretense at being all inclusive; they are merely suggestive. Hence, they must be regarded as *a* source of research ideas, but not *the* source.

A. Inventories for Geographic Education

This listing recognizes that research must begin from a research base. One of the fundamental research bases is knowledge of the research findings of the past. To date no such research inventories or bibliographies are available for the students of geographic education. The following are suggested:

1. A complete inventory of research in geographic education, both domestic and foreign.

2. An inventory of literature in psychological research related to learning theory and space.
3. A status study of geography instructors in teacher education programs.
4. A status study of elementary and secondary teachers and supervisors of geography.
5. Studies of great teachers of geography and the meaning of their work to geographic education.
6. An inventory of the amount and kinds of geography in the social studies curricula (separate, integrated, etc.).
7. An inventory of research needs in geographic education as perceived by curriculum directors and supervisors.
8. A rated inventory of geographic skills relevant to grades K-6.
9. A rated inventory of geographic concepts relevant to grades K-6.
10. An image study: what do influential people think about geography and its place in general education.
11. A study of the geography vocabulary suitable for various grade levels.
12. Follow-up studies, at periodic intervals, to determine retention of geographic facts, concepts, and skills.
13. A periodic inventory of geographic skills and concepts as found in elementary textbooks.

B. The Learning Process and Geographic Education

The listing that follows recognizes areas of interest shared by the psychologist and the geographer. The psychologist concerned with cognitive learning has knowledge of the child to share with the geographer. The geographer, obviously, has knowledge of the structure of his discipline to share with the psychologist. Studies relating the work of these scholars can be of great value in searching out the proper role of geography in the school curriculum.

1. Cognitive learning in geography at the various grade levels.
2. The effectiveness of verbal as compared with non-verbal geographic materials in particular learning situations.
3. The functional inter-relationships of two or more geography concepts at a variety of grade levels.
4. The degrees of complexity of physical and cultural concepts at different grade levels.

5. Pupil comprehension of units of measurement (square mile, acre, time as a measure of distance, density, etc.) used in geography.
6. Methods of teaching the child to think spatially.
7. Female and male competencies in acquiring map skills.
8. The most effective ways of expressing and teaching map scale.
9. Methods of teaching relative location at different grade levels.
10. Relationships of class size to learning specific geographic concepts and/or skills.
11. The optimum time and methods for teaching the concepts of direction (up-down, north-south, etc.).
12. The effectiveness of the sketch map vs. the outline map for learning place locations.
13. The most effective and efficient ways of teaching concepts of distance, direction, and space.
14. The most effective ways to teach direct observation of areal association and spatial interchange in field study of specific problems.
15. The age and background conditions which are suitable in grades K-6 for teaching the various concepts and skills required for map use and map making such as:

directions	categorization of data	emphasis
distances	symbolization	place name spellings
locations	generalization	mechanical drafting
relative position	relief vs. elevation	type styles and sizes
scales		use of color

16. The case study as a means of teaching geography at grades K-6.

C. Curriculum Development in Geographic Education

Persons concerned with geographic education have probably devoted more time to problems related to curriculum development than to any other major strand of concern emphasized in this report. Nevertheless, when analyzed from a research viewpoint, there are great chasms of ignorance that loom before the interested student. These chasms await bridging.

1. How can the curriculum allow for effective teaching of the culturally disadvantaged?

2. What are the different levels of conceptual development expected from the study of the same region (as Midwestern U.S.A.) at different levels of instruction (in grades 5 and 9)?
3. At what grade level can specific skills (map reading) be taught most effectively?
4. How can the curriculum be structured to make agricultural processes and patterns become intelligible to the child living in a city?
5. What facets of urban geography should be introduced at varying grade levels, and in what order, to make the city intelligible to the child?
6. Does early instruction in foreign languages affect geography learning?
7. What are the implications of the "new mathematics" to geography?
8. Is "journey geography" an effective method of instruction?
9. How can the curriculum be organized so that political entities can be comprehended at a variety of scales (local community, county, state, etc.)?
10. Can geography be best taught as a part of integrated social studies or as an independent subject?
11. What are possible new frontiers of map use?
12. To what extent are the graded map skills useful to geography of value to the other disciplines?
13. What kinds of laboratory experiences are suitable at the various grade levels?
14. On the basis of controlled experiments, what is the most effective scope and sequence in geography, K-6?
15. What aspects of geography may be utilized in programs of special education for retarded and handicapped children?

D. Instructional Materials and Equipment For Geographic Education

Someone has said that geographers are naturally "hardware" oriented. Of course, geographers are concerned with the proper use of maps and globes. Likewise the slide, filmstrip, study-still, and motion picture have had an impact on the teaching of geography as a means of making places "come alive." Newer media, such as the overhead projector and the film cartridge, also have been seized upon by geographers as effective

tools in geographic education. Yet the research-oriented geographer and educator has paid scant attention to assessing the effectiveness of one tool over another or to increasing the efficiency of these tools.

1. What is the relative usefulness of wall maps as compared with projected maps of the same size?
2. How large should wall maps be for effective geography learning in lecture-recitation situations?
3. What aspects of geography are best developed through programed learning?
4. What, if any, geographic concepts, skills, topics, etc., can be developed through A-V media? What media are best for each purpose?
5. What map projections are best suited for developing initial global concepts at the beginnings of geographic study?
6. How many purposes can an individual map serve at a given grade level?
7. What is the relative effectiveness of color over black-and-white maps and pictures?
8. How effective is the hypsometric map at elementary levels?
9. What are the most effective sequential uses of globes in K-6?
10. Is the pictorial map effective in conveying geographic information?

E. Measurement in Geographic Education

The National Council for Geographic Education has long been concerned with measurement and evaluation in geography. One tangible result of this concern was the publication in 1965 of the "Geography Achievement Test for Beginning High School Pupils." This, of course, is just a beginning and the three topics listed below are but suggestive of the research needs in this area of geographic education.

1. Preparation of standardized tests to evaluate student's understandings of major portions of the world.
2. Evaluation of tests to discover those that best measure regional understanding, skill development, etc.
3. Study of the effectiveness of essays in measuring depth of geographic understanding.

F. Teacher Preparation and Geographic Education

One of the recognized shortcomings in pushing forward research frontiers in geographic education has been the lack of

personnel in geography with special skills in educational and/or psychological research. Programs leading to a break-through of this barrier are certainly one of the real challenges to the graduate departments of geography in Anglo-America. Vital, too, to the up-grading of school geography is the development of experimental programs in the training of skilled and knowledgeable geography teachers.

1. Experimentation with a variety of curriculum designs in geography teacher education.
2. Experimentation with a variety of in-service training programs for updating teachers of geography.
3. Experimentation with graduate programs for the training of personnel for research in geographic education.

PART IV

Some Opportunities for Geography in The U.S. Office of Education*

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Education is to be one of the prominent pillars in the "Great Society." The National Defense Education Act (NDEA) of 1958 which was greatly expanded by amendment in 1964 has been followed by the Elementary and Secondary Education Act (ESEA) of 1965, the Higher Education Act (HEA) of 1965, and a host of others. The U.S. Office of Education now administers more than 70 different programs and what was a $602 million-a-year operation in fiscal year 1962 has a budget of nearly $4 billion.

Because of this dramatic expansion, the Office of Education was completely reorganized in June 1965. It now has four basic bureaus: the Bureau of Higher Education, the Bureau of Elementary and Secondary Education, the Bureau of Adult and Vocational Education, and the Bureau of Research. Each bureau is divided into divisions, which in turn are divided into branches, then sections, and finally units.

The Bureau of Research overlaps the other three, which are generally consumer oriented; the ultimate consumer determines the bureau which will sponsor a program. For example,

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the NDEA Summer Institute Program, with which many geographers are familiar, comes under the Bureau of Elementary and Secondary Education, despite the fact that the Institutes are held on college campuses, because the participants, who are the ultimate consumers, are elementary and secondary school teachers.

When seeking information about a particular program administered by the Office of Education, the best approach is to go directly to the official who supervises it. He may be anyone from a unit coordinator to the Commissioner himself, or in rare instances, the Secretary of the Department of Health, Education, and Welfare or a member of his immediate staff. However, any correspondence which is sent to the wrong person will be forwarded to the appropriate official.

What has all this to do with geography? Geography was specifically included as one of the nine critical subject matter areas in the 1964 amendment of the National Defense Education Act. Others of the 19 different laws under which the Office of Education expenditures are authorized have relevance to geography. The ESEA and HEA are especially significant additions to the NDEA. All three of these acts are subdivided into a number of Titles. The NDEA has 11, the ESEA has 5, and the HEA has 8. Citation of the proper title is important when referring to any program. The titles of greatest significance to geographic education are briefly discussed below.

The National Defense Education Act

Title II provides for loans of up to $1,000 a year, to a maximum of $5,000, for undergraduate students and up to $2,500 a year, not to exceed $10,000, for graduate and professional students. As much as half of the repayment of the loan may be canceled if the recipient pursues a teaching career in elementary, secondary, or higher education. The entire loan may be canceled for teachers who teach in certain eligible schools located in low-income areas.

Title III provides matching funds for three purposes: (1) to enable elementary and secondary schools to acquire equipment and materials for improving instruction in geography; (2) to enable individual state departments of education to hire state supervisors of geography and to provide related services; (3) to develop in-service training programs for teachers of geography.

Title IV provides fellowships for up to three years of study in an approved graduate program leading toward the Ph.D.

degree in preparation for college teaching. Students may receive annual stipends ranging from $2,000 to $2,400, plus $400 for each dependent. The participating institution receives $2,500 a year for every Title IV NDEA fellow (less any amount charged for tuition) to cover its costs of educating grantees. These fellowships are awarded directly to the graduate schools participating in the program. Fifty-two have been awarded in geography since the program started in 1961, and 54 more were available in the fall of 1966 at the following institutions:

University of California at Berkeley
University of California at Los Angeles
Clark University
University of Colorado
Columbia University
University of Georgia
University of Illinois
University of Iowa
Johns Hopkins University
University of Kansas
University of Michigan
Michigan State University
University of Nebraska
University of North Carolina
Northwestern University
University of Oklahoma
University of Oregon
Pennsylvania State University
Rutgers—The State University
Syracuse University
University of Washington

Title XI, which thus far has had the greatest impact on geographic education, authorizes institutes for advanced study to improve the qualifications of elementary and secondary school personnel. Approximately 12,000 teachers, supervisors, and trainers of teachers applied for the NDEA geography institutes which were offered in 1965 and 1966, and 2,936 were selected for participation. There will be about 830 participants in 25 institutes in 1967. In addition to short-term summer programs, approval may be given to full-time and part-time institutes to run during the academic year. This year's program includes an institute for trainers of teachers, an educational media work-

shop for institute directors, and an institute for institute directors which will be conducted by the High School Geography Project.

The Higher Education Act

Title I provides support for new and innovative educational programs (including programs of research, university extension, and continuing education) which are designed, under an approved State plan, to assist in the solution of community problems in rural, urban, or suburban areas. High priority is given to the examination of problems in land use, transportation, and recreation—subjects of considerable interest to geographers.

Title II provides assistance to develop library resources, train librarians, and conduct research in library science. This title should be of special interest to departments which are in the process of improving their geography library collections because it authorizes funds for the purchase of books, periodicals, documents, tapes, records, and certain relevant physical facilities and equipment.

Title III provides for national teaching fellowships, with stipends of up to $6,500 per academic year plus $400 per dependent, to encourage highly qualified graduate students and junior faculty members to teach at developing institutions of higher education.

Title IV authorizes Educational Opportunity Grants of from $200 to $800 annually for students from low-income families. It also provides for a new program designed to help students obtain long-term, low interest loans from private commercial lending agencies. An undergraduate student may borrow as much as $1,000 a year, up to a total of $5,000; a graduate student as much as $1,500 a year, up to $7,500. The program authorizes federal payment of interest during study years and half of the interest during the loan payment period, which begins nine months after graduation.

Title V creates a National Teacher Corps and establishes fellowships of up to two years for elementary and secondary school teachers and prospective teachers who wish to pursue programs of graduate study not leading to a doctorate. The grants provide for tuition and fees, stipends, and dependency allowances. The fellowships for both programs will be allotted

en bloc, directly to particular departments of the participating institutions.

For the academic year 1966-67, fellowship programs in geography were granted to Clark University and to the University of Georgia under the Prospective Teacher Program and to the Ohio State University, the University of Minnesota, and Oregon College of Education under the Experienced Teacher Program. In addition to these fellowships in geography, a total of fifteen social science programs were approved, all of which include some amount of geography instruction.

Title VI, which is especially relevant to the problems faced by those geographers who are responsible for conducting large sections of introductory courses, is aimed at improving the quality of undergraduate classroom instruction. It authorizes funds to help in the purchase of equipment and materials such as television apparatus, tape recorders, and motion picture projectors.

The Elementary and Secondary Education Act

Title I of the ESEA is probably the most encompassing of any of the titles discussed in this treatise. It is primarily intended to improve the education of disadvantaged children and provides funds for a great variety of needs ranging from school breakfast programs to those of curriculum development. It is expected that millions of dollars will be spent on in-service teacher training under the auspices of Title I and many of the resulting programs will focus upon the social sciences and upon geography.

Title II authorizes funds for school library resources, textbooks, and other instructional materials for elementary and secondary schools.

Title III provides funds to enable local school agencies to establish supplementary centers and provide services not presently available, raise the quality of available services, and stimulate the development of new and innovative programs which can serve as models.

Title IV authorizes the expenditure of 20 million dollars a year for five years for educational research and training, including the training of educational research personnel and construction of facilities. Research, for the purposes of this title, has a remarkably broad definition.

Title V provides funds for strengthening state departments of education, to enable them to identify the educational needs of the state, and to design programs to meet these needs. This Title, and Title III of the NDEA, are of vital importance to geography, for many of the proposals which can be funded by the Office of Education must be developed at the state and local level, and geographers and geography will fail to realize the full potential of these programs if they are not properly represented in each state department of education by competent professionals. Geographers are encouraged to improve their liaison with state education departments and to offer their fullest cooperation in the development and improvement of programs in geography and the social sciences.

For More Information

The most useful source of information about the various programs funded by the U.S. Office of Education is a monthly journal entitled *American Education,* which may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 at a subscription rate of $3.75 per year, effective February 1, 1967. The ESEA was discussed in the April 1965 issue, the HEA in the November 1965 issue, and the July-August 1965 issue contained a general article on all Office of Education programs.

Copies of the appropriate enabling legislation for any of the programs administered by the U.S. Office of Education may be obtained from the Government Printing Office by a request giving the name of the particular act. The offices charged with responsibility for administering programs under the various titles discussed above usually publish guidelines or other instructions as to how to apply for grants. For more information about any of the specific programs discussed in this article, contact the relevant office listed below:

NDEA

Title II: Student aid office of the university of your choice.

Title III: Division of Plans and Supplementary Centers
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title IV: Graduate Academic Programs Branch
Division of Graduate Programs
Bureau of Higher Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title XI: Division of Educational Personnel Training
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

HEA

Title I: Division of Adult Education Programs
Bureau of Adult and Vocational Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title II: Division of Library Services and Educational Facilities
Bureau of Adult and Vocational Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title III: Division of College Support
Bureau of Higher Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title IV: Division of Student Financial Aid
Bureau of Higher Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title V: *For experienced teachers:*
Division of Educational Personnel Training
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

For prospective teachers:
Graduate Academic Programs Branch
Division of Graduate Programs
Bureau of Higher Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title VI: Division of College Facilities
Bureau of Higher Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

ESEA

Title I: Division of Compensatory Education
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title II: Division of Plans and Supplementary Centers
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title III: Division of Plans and Supplementary Centers
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title IV: Division of Laboratories and Research Development
Bureau of Research
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Title V: Division of State Agency Cooperation
Bureau of Elementary and Secondary Education
U.S. Office of Education
Department of Health, Education, and Welfare
Washington, D.C. 20202

Epitome

The NDEA, ESEA, and HEA are presently of greatest significance to geography. There are other acts and titles that may have promising possibilities. It is encumbent upon the profession, and especially upon those most concerned with geographic education, to become intimately familiar with the U.S. Office of Education and the legislation which it administers. The geography profession would then have greater assurance of appropriate participation in the important new educational programs recently enacted into law.